

CENTRAL INTELLIGENCE AGENCY

INFORMATION REPORT

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- When during World War II detectors (diodes) were needed in large numbers, the so-called Guenther method was used for making polycrystalline silicon layers. This method was developed by Prof. GUENTHER (fnu), then in Breslau. The basic material was silicon sand (SiO_2), which was reduced with the aid of hydrogen into silicon. The later substance was transformed into silicon tetrachloride (SiCl_4) by way of chlorinization. In this way a colorless liquid with a boiling point of about 60° Centigrade was obtained. The liquid was purified through fractional distillation. The distillation was repeated as many times as was necessary to obtain sufficient purity. The purified silicon tetrachloride was reduced with aluminum vapor in a quartz tube at a temperature of 900° Centigrade. The final result was silicon of spectral purity which was precipitated in polycrystalline layers. This silicon was used for the making of detectors by steaming it upon graphite.
- Silicon research was resumed in 1952 by the Academy Institute for Research on the Physics of Solids in Berlin-Buch and by the Research and Development of VEB Werk fuer Bauelemente der Nachrichtentechnik (formerly Dralowid) in Teltow. This research was carried out with a view to the possibility of making silicon transistors. Around the middle of 1952, the Dralowid development team, under the direction of Dr. Mathias Falter, constructed an oven with a quartz tube for the purpose of applying the Guenther method of silicon purification. The final result of the purification, however, was not to be pure silicon in polycrystalline form but--with a view to its ultimate transistor purpose--silicon monocrystals. In order to attain this result, the Guenther method was applied under changed experimental conditions. For instance, the speed of flow of the silicon tetrachloride vapor was varied, as well as the width of the heated zone of the glass tube, etc. These experiments were carried on until the fall of 1954. As a result, silicon monocrystals of 1 x 1 millimeter thickness were obtained in the form of small foils. These monocrystals could not be used for transistor purposes but were successfully used for making silicon diodes.

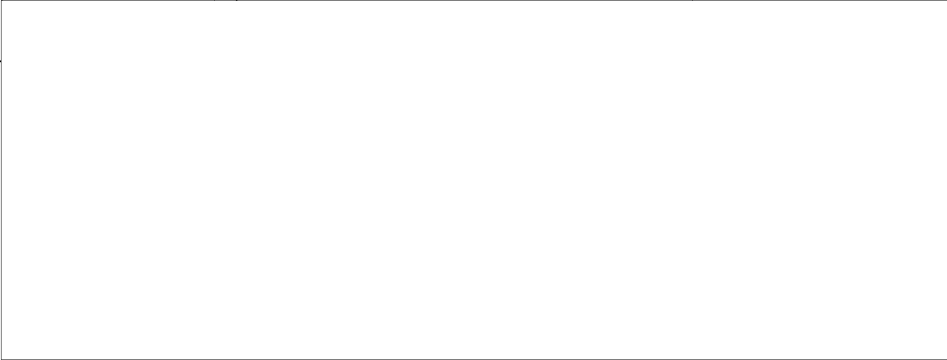
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3. In late 1952 and 1953, the Academy Institute in Berlin-Buch was charged with improving the rectifier qualities of the silicon monocrystals produced by Dralowid as described above. In about the middle of 1953, the Institute succeeded in attaining higher inverse voltages through bombarding silicon monocrystals provided by Dralowid with argon and hydrogen ions. Inverse voltages between 10 and 15 volts were obtained in this way, whereas the monocrystals had inverse voltages of only 3 to 4 volts prior to the bombardment.
4. When in 1954 the Dralowid plant succeeded in developing germanium transistors of the point-contact type¹, this enterprise discontinued the silicon research for transistor purposes and confined its transistor research activities to germanium. Silicon research is being continued at the Academy Institute in Berlin-Buch, but it has not progressed beyond the results obtained up to 1954. The Institute has not yet succeeded in developing silicon monocrystals with defined impurities for transistor purposes. As of early May 1955, this result had not been attained in any research institute or laboratory anywhere in East Germany either.
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